



CDDIS

NASA's Archive of Space Geodesy Data

CDDIS Update for USWG

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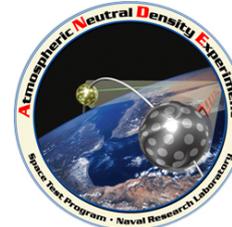
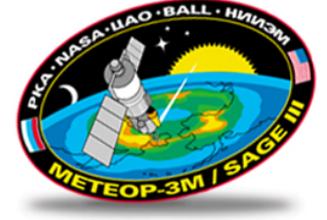
CDDIS Manager/Code 690.1

- Background
- Data description
- User description

CDDIS Overview

- NASA's active archive of space geodesy data, products, and information
- CDDIS funded by NASA/ESDIS but cooperates extensively with the international community
- Major user community are services within the International Association of Geodesy
- Majority of CDDIS archive utilized for geodetic studies, e.g., plate tectonics, earthquake displacements, Earth orientation, etc.
- Plays an interdisciplinary role in supporting derivation of the ITRF, POD for NASA/international missions, atmospheric studies, etc.

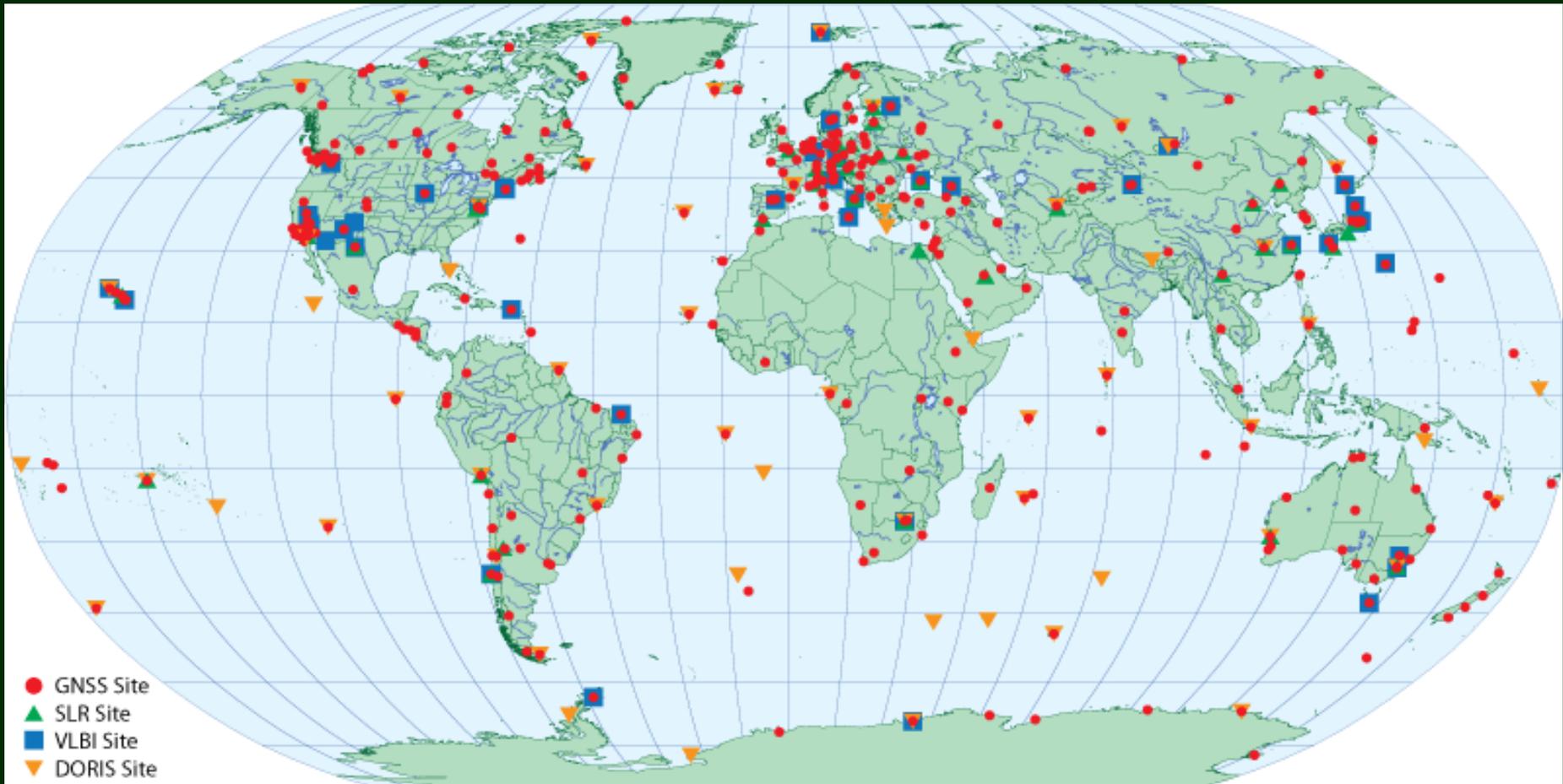
Supported Missions and Programs



CDDIS Support of Space Geodesy

- Data
 - GNSS: 421 sites tracking GPS, GLONASS
 - Laser Ranging (SLR and LLR): 42 sites tracking 35+ satellites (including the Moon)
 - VLBI: 45 sites
 - DORIS: 58 sites tracking 6 satellites
- Products
 - Precise network station positions (for ITRF)
 - Satellite orbits (for POD)
 - Station and satellite clocks (for timing)
 - Earth rotation parameters
 - Positions of celestial objects (for CRF)
 - Atmospheric parameters (Ionosphere TEC, Troposphere ZPD)
 - ...

CDDIS Data: Global Networks



CDDIS Archive

- Archive size: ~5Tb
- Ingest rate: ~3Gb/day
- Distribution rate: ~40Gb/day, 400K files/day
- Files:
 - Data (L1, L1B), products (L2) derived from these data, and information about data and products
 - Multi-day, daily, hourly, sub-hourly
 - Varying latencies (minutes, hours, days)
- Metadata:
 - Non-standard, data type specific
 - Extracted from data (not all products) and loaded into database (Oracle now, MySQL RSN)
 - Internal access to database

CDDIS Users

- Majority may be considered “Science Team” or “Production” type users
 - Analysis Centers supporting IAG services, tasked with providing standard products as per service specifications
 - U.S. and international groups who produce products for use in higher level products (e.g., orbits for GRACE, Jason, etc.; ionosphere/troposphere products for weather models)
 - Retrieve files from CDDIS to equalize data holdings among other data centers supporting IAG services
- Require continuous access to data for generation of products or update of archives on pre-determined schedules
- Use scripts to automate retrieval of required files through ftp
- ~70% of CDDIS user base

Novice/Occasional Users

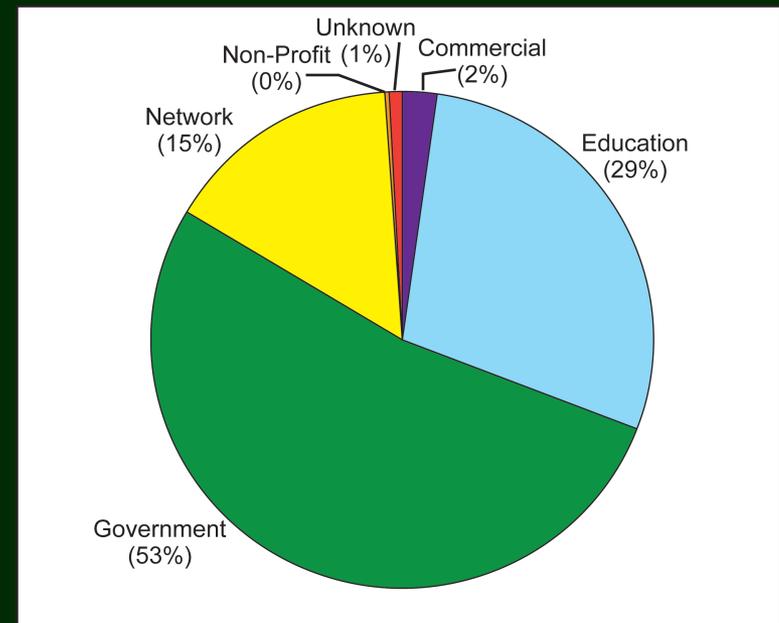
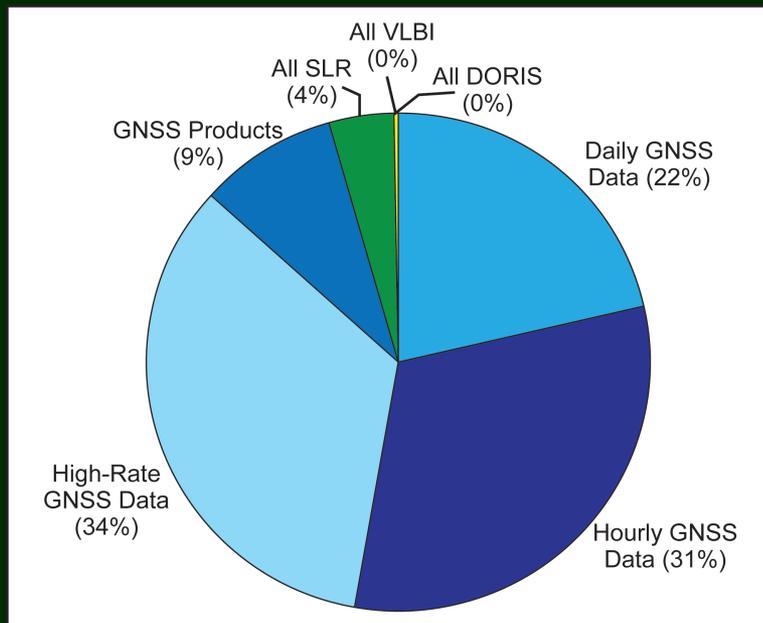
- Need to explore the contents of the archive by spatial, temporal, platform, or parameter specifications
- Access archive through ftp to:
 - Pick and chose data or products
 - Grab large subsets of data on irregular basis
- Examples:
 - Federal, state, international surveyors who use GNSS reference station data for local measurements
 - Military users who download SLR data for calibration of radars for space debris tracking
 - Managers who need statistics on network data production (metadata search)
 - ...
- 30% of CDDIS user base

Recent Developments

- Several new geodesy data and products added to archive
- CDDIS distribution logs now operational in EMS
- CDDIS web metrics also operational in EMS
- GCMD data set descriptions updated; additional product descriptions to be supplied
- Migration to distributed server environment continues

CDDIS Usage Statistics

- ~9.5 M files, 1.1 Tb/month:
 - Science Users: 4 M files, 440 Gb/month
 - Production Users: 2.5 M files, 310 Gb/month
 - General Users: 3 M files, 300 Gb/month



Future Developments: Enhancing CDDIS Data Discovery

- Plan to develop a search/metadata interface tool for CDDIS to:
 - Aid users in discovery of CDDIS data, products, and information
 - Aid staff in archive management
 - Promote CDDIS data holdings to a broader community (e.g., through metadata standards)
- Specify (any/all):
 - Temporal: Year, date/time, range
 - Spatial: Region, lat/lon, range
 - Target: Satellite (SLR, DORIS)
 - Designation: Station name/number/code
 - Parameter: Receiver type (GNSS), event timer (SLR), antenna type (GNSS, VLBI), ...
- Results:
 - List of sites satisfying specifications
 - List of data holdings satisfying specifications
 - Metadata relevant to selection
 - ...

Background Slides

Space Geodesy (2/2)

- Stations in the GNSS, SLR/LLR, VLBI, and DORIS networks generate point data on a multi-day, daily, hourly, and/or sub-hourly basis
- File size is typically <2Mb/data “granule”, <10Mb/derived product “granule”

GNSS: Satellites (GPS-U.S., Russia-GLONASS, future EU-Galileo) equipped with precise clocks transmitting messages such as ephemeris, clock offsets, etc. to ground (and spaced-based) receivers to measure station to satellite pseudorange, phase delay



SLR/LLR: Ground-based short-pulse laser transmitting to satellites (or planetary targets) equipped with corner cubes to measure round-trip pulse time-of-flight to satellite



VLBI: Radio telescopes equipped with X/S wideband receivers record signals from quasars to measure difference in signal arrival times



DORIS: Satellites equipped with DORIS receiver and uplink hardware transmit signals to ground beacons to measure Doppler shift on radiofrequency signals



Flow of Files to/from CDDIS

(Information, Data, Products)

